# free.[illegible]ro

WORLDWIDE PARAGLIDING AND PARAM[illegible]E. FOR FREE.

## 2016
## A NEW SEASON

- SAFETY: HARNESS BUCKLES
- CONTROLLING WITH THE ACCELERATOR

TESTS

- SWING MITO
- BGD CURE
- GIN CARRERA +
- AIR CROSS DOUBLE U

Photo : Jérôme Maupoint

ISSN 2267-1307

**Front cover:**
**Photographer Jérôme Maupoint making the most of the spring thermals in May 2016 at Ager, Spain, on a GIN Sprint 3.**

# CONTENTS

*Translation by Ruth Jessop*

The summits await your 'hike and fly' dreams.

The last patches of snow are melting…

Photo: Markus Gründhammer


Aaron Durogati doing a 720° into the landing field in Bir, India.

Photo: Albasark, http://albarsark.com/wordpress

The start of the summer is the best time to discover the wilderness of the northern countries like the Faroe Islands, pictured here.
Photo: Noe Chaparro


The sea, whether at Roquebrune or Ölüdeniz, gives our flights a new dimension.
Photo: Skywalk

Two Adventure Smarts discovering the coast in Portugal.

Photo:  Adventure


Cross Country EN/LTF B+

# IKUMA

## *Back Country*

Venture into new territories. Make your own and alternative paths. Get off the road and discover Cross Country flying from a new perspective with the best safety-performance ratio.

niviuk.com

Photo : independence

# INDEPENDENCE GERONIMO 2: PRIME, POINT BY POINT PRIZES

The Geronimo 2 is the new high end EN B wing from Independence. Made in Dominico 20D with a soft, flexible finish for the lower and upper surfaces, it fits into the niche of wings perfectly suited to XC flying, whilst being safer than an EN C. During its development, particular attention was paid to the stability of the leading edge.

To increase the number of flights declared on this wing, Independence are offering prizes in the form of gift vouchers for each point registered on the following servers in 2016: www.xcontest.org and www.dhv-xc.de

A detailed scale can be found on the manufacturer's site: www.independence.aero

## GERONIMO 2 - TECHNICAL DATA

Manufacturer: Independence Web: http://www.independence.aero/ Mail: info@independence.aero
Tel: 00.49/(0) 83.64/98.33.0

| Year | 2016 | | | |
|---|---|---|---|---|
| SIZE | XS | S | M | L |
| CELLS | 59 | 59 | 59 | 59 |
| FLAT SURFACE AREA [m²] | 23 | 25 | 27 | 29 |
| PROJECTED SURFACE AREA [m²] | 19.37 | 21.06 | 22.74 | 24.43 |
| FLAT WINGSPAN [m] | 11.33 | 11.81 | 12.27 | 12.72 |
| PROJECTED WINGSPAN [m] | 9.61 | 10.01 | 10.31 | 10.71 |
| FLAT ASPECT RATIO | 5.58 | 5.58 | 5.58 | 5.58 |
| PROJECTED ASPECT RATIO | 4.71 | 4.71 | 4.71 | 4.71 |
| ALL UP WEIGHT [kg] | 55 - 80 | 65 - 90 | 80 - 105 | 95 - 120 |
| CERTIFICATION EN / LTF | B | | | |
| Material | Dominico D20 40g/m2 | | | |
| PRICE [€] | 3 400 | 3 400 | 3 400 | 3 400 |

Photos : Niviuk

# NIVIUK KOYOT 3

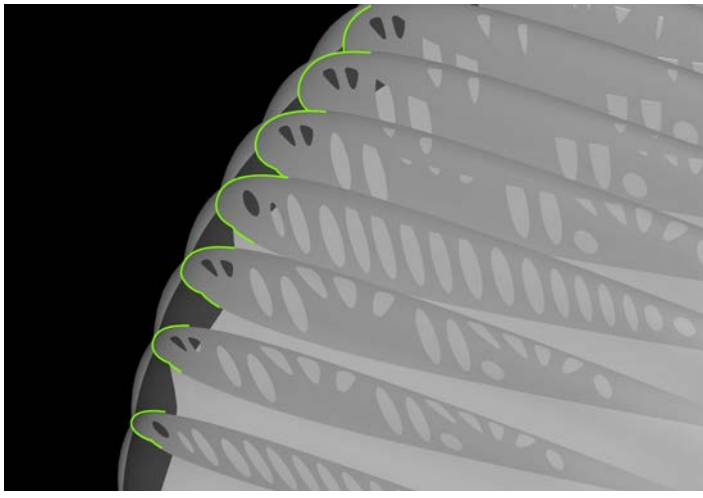
According to Niviuk, for the new generation EN A Koyot 3, the designers started with a blank sheet of paper. There are 7 reasons to choose the Koyot 3

- An internal structure which gives a very compact wing with an excellent level of comfort and security.
- Nitinol leading edge rods with all their advantages (maintaining the profile's shape, durability) on an EN A
- RAM, Niviuk's version of the SharkNose, giving increased safety at lower speeds and a reduced risk of collapse.

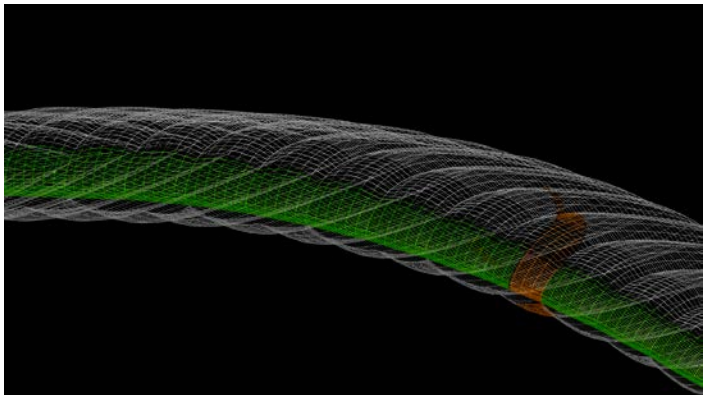
# NIVIUK KOYOT 3

- 3D Pattern Cut and 3D Leading Edge: Niviuk's 3D shaping also takes into account the direction in which the fabric has been woven.
- 3 line wing: 20% fewer lines compared to the Koyot 2..
- Risers specially adapted for beginners with different colours for right and left and an easy grip for the outer As for the ears..
- Increased brake travel; 8% more than on the Koyot 2 making it safer.

Niviuk promise "*a wing which is easy to control, with a gentle, tolerant temperament, which allows intuitive and instinctive steering.*"



**RAM technology is Niviuk's SharkNose. The EN A Koyot 3 is equipped with it to maintain the ideal internal pressure over a large range of angles of attack. It should, amongst other things, result in a better absorption of turbulence, be more efficient and give better behaviour at low speeds.**



**Niviuk's 3DL and 3DP technology corresponds to the manufacturer's specific 3D shaping, as well as the orientation of the fabric chosen with regard to the stresses put on it. The result is a more efficient profile and longer life.**

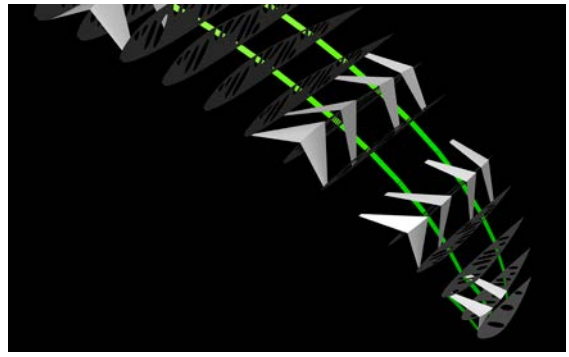
# NIVIUK KOYOT 3

The Koyot 3 "*brings together innovative technology, giving excellent performance and a lot of room to improve. It's playful, safe and designed for everyone.*"

## KOYOT 3 TECHNICAL DATA

Manufacturer Niviuk Web: http://www.niviuk.com Mail: info@niviuk.com
Tel: +34 972 422 878

| YEAR | 2016 | | | | |
|---|---|---|---|---|---|
| SIZE | 22 | 24 | 26 | 28 | 31 |
| CELLS | 36 | 36 | 36 | 36 | 36 |
| FLAT SURFACE AREA [m²] | 22 | 24 | 26 | 28 | 31 |
| PROJECTED SURFACE AREA [m²] | 19.04 | 20.77 | 22.50 | 24.23 | 26.83 |
| FLAT WINGSPAN [m] | 10.44 | 10.90 | 11.35 | 11.77 | 12.39 |
| PROJECTED WINGSPAN [m] | 8.48 | 8.86 | 9.00 | 9.56 | 10.06 |
| FLAT ASPECT RATIO | 4.95 | 4.95 | 4.95 | 4.95 | 4.95 |
| PROJECTED ASPECT RATIO | 3.78 | 3.78 | 3.78 | 3.78 | 3.78 |
| ROOT CHORD [m] | 2.00 | 2.67 | 2.78 | 2.88 | 3.03 |
| ALL UP WEIGHT [kg] | 45 - 70 | 60 - 80 | 75 - 95 | 90 - 115 | 110 - 135 |
| WEIGHT OF THE WING [kg] | 4.2 | 4.5 | 4.9 | 5.1 | 5.4 |
| CERTIFICATION EN / LTF | A | | | | |
| Material | Upper surface S9017-E25 38 g/m² | | | | |
| PRICE [€] | 3 100 | 3 100 | 3 100 | 3 100 | 3 100 |



The design of the internal structure gives a wing which is very compact and with good damping during turbulence.

free.aero MAGAZINE

### THE EDITOR'S OPINION

The Koyot 1 in 2008, the Koyot 2 in 2012, and the Koyot 3 in 2016: logical. The Koyot 1+2 were excellent beginner wings renowned amongst instructors for their accessibility, their ease of inflation and their tolerance.

A version 3 integrating technology such as the SharkNose, better 3D shaping and Nitinol rods for the first time, should give a very promising result. In addition, the wing has shed 500 grammes which is good during inflation, as well as for its behaviour in the air.

By giving the performance and steering a bit extra, this could make the Koyot 3 a very flexible wing, which will take pilots a long way in their flying career.
To be tested...

# LM6

by OZONE

## LIGHTWEIGHT HIGH PERFORMANCE

The LM6 is the light version of the Mantra M6. We applied the proven lightweight construction techniques that have made OZONE a leader of light equipment for more than a decade to one of the most successful Performance-Competition wings in our range. The result, we think, speaks for itself.

Over the course of our testing and development, we have taken the 3-line concept to its absolute maximum, incorporating the best design elements of the LM5 whilst increasing the number of cells, modifying the planform, and optimising the line plan. The LM6 yields a higher top vspeed and better glide performance, with a more compact and stable feel in active air. With an aspect ratio of 6.92, an efficient pitch stable profile, a 23% total line drag reduction, and a highly refined internal tension, the LM6 offers improved performance relative to the LM5.

We've designed the LM6 specifically for vol-biv adventures that require the highest level of performance. We look forward to your feedback on this exciting new wing, and most of all we want to hear about your adventures with it, so please send us news of your flights. Cheers, from all the Team.

WWW.FLYOZONE.COM

pilot: **Cody Mittanck** photo: **Loren Cox**

# GIN SPRINT 3

Gin has finally started to deliver the Sprint 3. This EN B has been designed to be balanced and very accessible whilst being reactive to the controls. The robust but nonetheless lightweight manufacture, based on Porcher Skytex 38 and 32, is also in keeping with current trends: 4.5 kg for the M, it's a 3 liner which can be steered equally from the Cs...

The reinforcements above the Cs are, in addition, part of the top of the range technology integrated in this wing.

## SPRINT 3 - TECHNICAL DATA

Manufacturer- - GIN Web : http://gingliders.com/parapente/sprint-3/ Mail : gin@gingliders.com
Tel : +82-31-333-1241

| | | | | | | |
|---|---|---|---|---|---|---|
| YEAR | 2016 | | | | | |
| SIZE | XXS | XS | S | M | L | XL |
| CELLS | 54 | 54 | 54 | 54 | 54 | 54 |
| FLAT SURFACE AREA [m²] | 21.05 | 22.85 | 24.88 | 27.00 | 29.20 | 32.08 |
| PROJECTED SURFACE AREA [m²] | 17.85 | 19.37 | 21.09 | 22.89 | 24.76 | 27.20 |
| FLAT WINGSPAN [m] | 10.95 | 11.41 | 11.91 | 12.41 | 12.90 | 13.52 |
| PROJECTED WINGSPAN [m] | 8.61m | 8.97m | 9.36m | 9.75m | 10.14m | 10.62 |
| FLAT ASPECT RATIO | 5.7 | 5.7 | 5.7 | 5.7 | 5.7 | 5.7 |
| PROJECTED ASPECT RATIO | 4.15 | 4.15 | 4.15 | 4.15 | 4.15 | 4.15 |
| WEIGHT OF THE WING [kg] | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 |
| CERTIFICATION EN / LTF | B | B | B | B | B | B |
| Material | Extrados: Porcher Skytex 38 E25. Skytex 32 E3W<br>Intrados: Porcher Skytex 38 E25. Skytex 32 E3W | | | | | |
| PRICE [€] | 3 950 | 3 950 | 3 950 | 3 950 | 3 950 | 3 950 |

# GIN SPRINT 3


The Gin Sprint 3 promotional video:
https://youtu.be/L1GbwZ-cV2M

## GIN SPRINT 3

Hot off the Team GIN press: Antoine Girard (FRA), two time competitor in the Red-Bull X-Alps (4th in 2015 and 3rd in 2013), will fly for GIN during his next challenge: the 2017 X-Alps!

Other news: The Fuse tandem (EN B) is now available in size 37 for a weight range of 95 to 175 kg.

https://youtu.be/L1GbwZ-cV2M

# AIRCROSS KONTEST

AirCross offer very lightweight parachutes. The U Safe 105 is a round parachute for a maximum all up weight of 105 kg maximum. It only weighs 1.42 kg. The U Safe 120 X is a square parachute for a maximum all up weight of 120 kg. It only weighs 1.49 kg according to the manufacturer.

www.aircross.eu

Kontest is also an importer for Karpofly, who have just launched a new version of their harness with inflatable back protection: the Karpofly Fantom Extra light 2 weighs 4.2 kg.

www.kontest.eu



# PARATROC

Paratroc are offering a new, simple, quick and robust stuff sack in water-proof fabric. With a draw string, clip fastening and large carrying straps, it costs 69 €.

www.paratroc.com

# HIGH ADVENTURE GLOVES

High Adventure, manufacture of, amongst other things, the Beamer steerable reserve, also make top of the range gloves for airsports.

The Itsy Bitsy Touch is a three season glove for spring temperatures or for use in high mountains even when the temperatures are below zero. The Itsy Touch is a lightweight glove for milder temperatures and summer days.

The gloves are made with fabric suitable for use with a smartphone touch screen.

http://www.highadventure.ch/fr/gant-itsy-touch.html
http://www.highadventure.ch/fr/gant-itsy-bitsy-touch.html

The 3 season Itsy Bitsy Touch gloves by High Adventure.

# OMIKRON

## ADVANCE GETS INTO

# ACRO

# ADVANCE OMIKRON

## *WITH THE OMIKRON, FOR THE FIRST TIME IN THEIR 27 YEAR HISTORY, ADVANCE HAVE LAUNCHED A PRODUCTION ACRO WING.*

According to the manufacturer, this wing is 'well balanced with great dynamics and easy to handle.' It is aimed at ambitious pilots doing acro for fun as well as professional acrobats. Advance promise smooth harmonious movements in Infinity Tumbles with a low centrifugal force. This wing should require less correcting. In a Helicopter, the speed of the rotation should modulate itself efficiently with the internal brake..

Sizes: 17 (All up weight 70-100 kg) or 18 (75-110 kg).

The Omikron was developed by acro pilots like Michael Maurer and Christian Proschek. It's the first development project under Christian's guidance. This 27 year old Austrian studied aeronautics at Salzburg. He started flying paragliders when he was 16 years old. He has collaborated with Advance since 2012 where he has worked on a variety of winglet configurations for the wing tips. Since 2015 he has worked there full time.

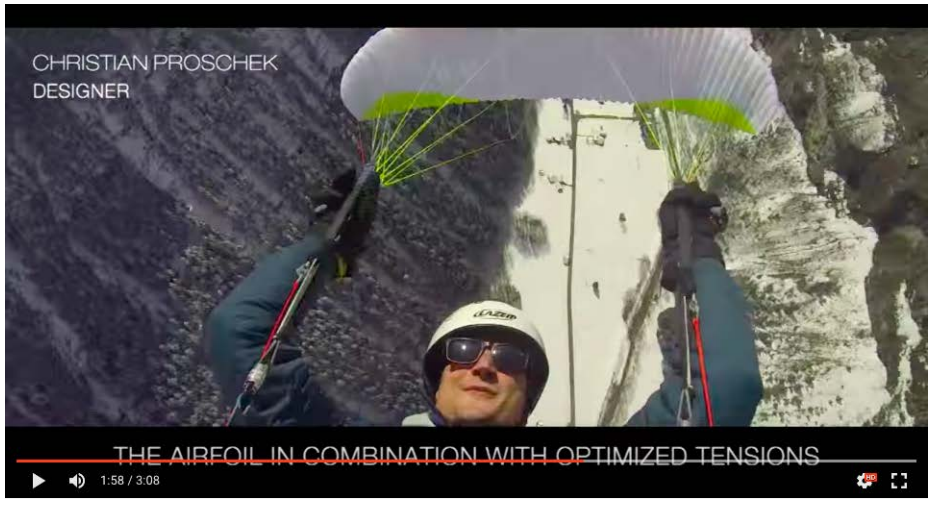
**free.aero :** *Christian, why haven't Advance had an acro wing before now?*

**Christian Proscheck :** *Yes there have been ones, but only as prototypes for the manufacturer's test pilots. Thomas Ripplinger and Chrigel Maurer developed a wing which beat the Infinity Tumbling record twice! Along with Michael Maurer, I took up the project so that we could participate in competitions. The demands in the acro world have changed a lot in the last few years, forcing us to virtually start again from zero. As the result was very convincing, our circle of pilots encouraged us to commercialise this wing. We therefore finished it and are now mass producing it. We're really looking forward to seeing the result in competitions this summer. With Gaetan Doligez and Eliot Nochez, we have two other top level pilots in our team.*

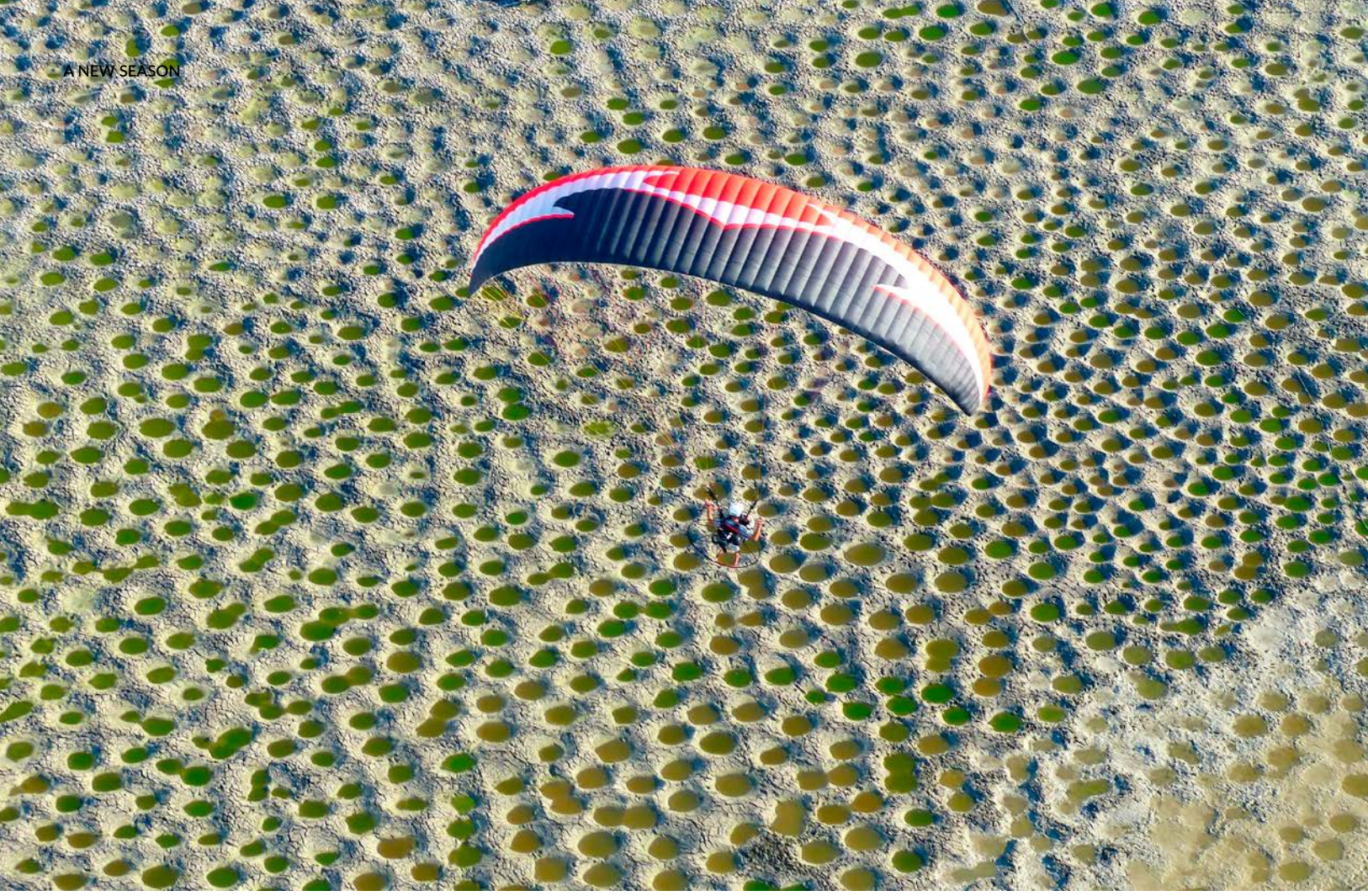
**free.aero :** *which of the modern techniques and knowledge learnt from other wings from the same manufacturer have been used in the design of the Omikron? What are the specifications?*

*In the other disciplines, lightweight has become very important. For an acro wing, subject to heavy loading, we didn't want to go down this road. We wanted a balanced wing which is easy and fun. A wing which is therefore sufficiently dynamic, whilst remaining easy to control. That doesn't require totally new techniques, but precise adjustment of the classic parameters: profile, plan form, curve, pressure...*

Christian Proscheck, one of Advance's young designers.



A wing specially made for Helicopters and Infinity Tumbling. The upper surface is made from Skytex 38, the lower surface from 40 Hardfinish. According to the manufacturer, the lower lines can support up to 24 G; the upper ones can take up to 52 G.



# APCO FORCE II

At Apco the second generation of the reflex wing, the Force, is now available. According to Apco, this wing is easier to inflate, takes off more easily than the first version and offers a larger, usable range of speeds.

The risers are equipped with a PK type System (making it possible to operate the trimmers with the foot accelerator as well).

www.apcoaviation.com


Football is much more fun like this: a match between two paramotors.
https://www.youtube.com/watch?v=uUN6X94x8DU

# All Mountain

**Light Versatility**

Hike & Fly, travelling with friends, local flying, fast action with a speedwing or high-altitude touring rounded off by a magnificent flight. With a PI 2, EASINESS 2 and STRAPLESS we offer versatile and light equipment for all your mountain and hill adventures. Interchangeable and flexible: You choose the parts you need.

advance.ch/allmountain


from 2,05 kg

from 1,47 kg

from 190 g

ADVANCE PI² EASINESS² STRAPLESS

Picture: Thomas Ulrich, visualimpact.ch

# PAYING WITH PARAGLIDERS

The Swiss National bank has put our favourite sport top of the pile: on the new 50 franc Swiss note there is a wing flying in front of the Swiss Alps. The graphic designer responsible for the drawing made the make of wing unrecognisable, but we've a pretty good idea which paragliding manufacturer served as a model.


Photo : Ozone

# OZONE SPEEDSTER 2

Five years ago, we tested the first Speedster. It was Ozone's first full reflex paraglider that was, at the same time, very easy to handle. Its success is history!

So now, the Speedster 2 is here and Ozone have incorporated all the new technology into it:

- A Shark Nose
- Improved internal structure
- Reduced line drag
- More cells
- New 2D steering system
- Reduced aspect ratio

The wing is EN C and DGAC certified and will be available in 4 sizes 22, 24, 26 and 28..

www.flyozone.com


Our test of the first Speedster in 2011. We'll be testing the second version in July.

free.aero MAGAZINE

## THE EDITOR'S OPINION

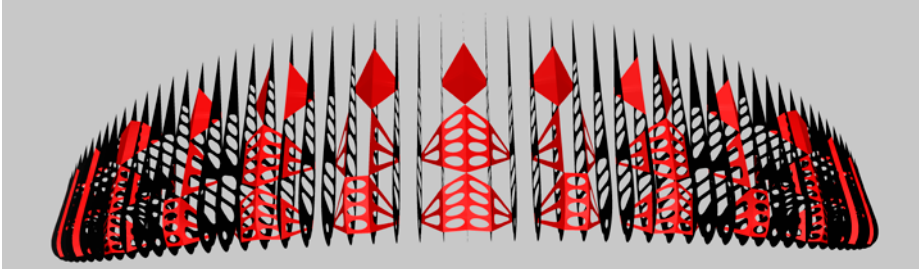
In 2011, we tested the first Speedster. This wing was a revolution; it set new standards for handling in the world of paramotors with reflex profiles.

It was understandably very difficult to make a worthy successor. Five years later, the version 2 hasn't been radically redesigned, but lots of details have been improved, as well as giving it all the modern technology, a part of which was invented by Ozone.

Such as the SharkNose: this alone brought extra stability, even easier inflation and increased safety at low speed.

No doubt an interesting evolution and modernisation. We're looking forward to testing it.

# OZONE : VIPER 4



The Viper 4 should be even more flexible than the 3 according to its designers and has, amongst other things, better slalom type handling. Lighter, lower aspect ratio and shorter lines: lots of factors which point to much better handling. The take off will be even easier too, and the improved speed, amongst other things is thanks to lots of work on the internal structure. The PK system of trimmers/accelerator has been redefined.

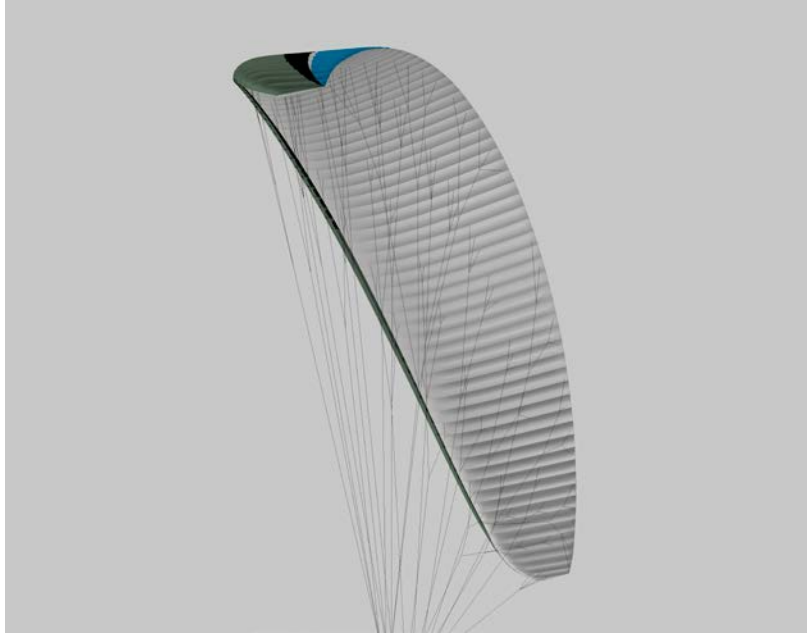
www.flyozone.com

free.aero MAGAZINE

## THE EDITOR'S OPINION

Not long ago, we gave a potted history of the development of the Viper models, by recounting the route taken by this powerful, high performance snake.


Our test pilot Sylvain Dupuis praised the unrivalled performance of the Viper 3 which came out in 2014. It was by far the highest performance wing that he had been able to try so far. But he also commented that '*in slalom, this wing obviously isn't in its element.*' Clearly influenced by champion Alex Mateos, Ozone wanted to quickly develop a version which was much easier to handle and suited to slalom to give the Viper flexibility in all the current competition disciplines.



The Viper 4 will be available in size 16, 18, 20, 22 and 24. For competition pilots, there will be a size 14. Certification: DGAC (therefore load tested too).


Rescue parachute EN/LTF
OCTAGON
Extraordinarily steady
Oscillation rate: 0-5º
Descent rate: 4,9 m/s
Also suitable for paramotor pilots up to 215 kg
niviuk.com

# XCTRACER MINI

In our 'Instruments' article we tested the XCTracer, acoustic vario-GPS with gyro/accelerometer/compass sensors which picked up, thanks to a very elaborate algorithm, the slightest upwards movement, as well as its ending when exiting the thermal.

Now we're also testing the XCTracer Mini, a similar instrument but without the GPS and powered by a solar panel. It's obviously a very nice instrument for hike and fly, and we'll give a full review of it in our next article which will focus on this activity. Our initial tests are already pretty conclusive. The algorithm seems to perform as well as that in the big XCTracer. When flying with both, side by side, the reaction when climbing and coming out of the thermal was identical, if anything, the XCTracer Mini seemed even more precise.

Price: 170 €

www.xctracer.com


www.gingliders.com

Sprint 3

## SKYWALK SEES BLUE

The wings Mescal 4, Masala 2 and the Tequila 4 are obviously still current. This year they will have a change of colour scheme: above, the Masala 2 in orange/cyan, photo right, the Mescal 4 in purple.

www.skywalk.info

# NOVA NOBLE IN BLACK AND GOLD

The Nova Ion 4 is now available in gold and the Somnium harness in Pure Black Edition. Noble – very classy!

www.nova.eu


# JDC BLUETOOTH

JDC are bringing out a new instrument for measuring the wind and other meteorological parameters. The BL range interfaces with smarphones via Bluetooth. No doubt an alternative for those who have compatibility problems with the Windoos (see our Instruments article). The BL will soon be available.

Further info:
https://bl.skywatch.ch/specifications



**For a quick reminder, here's our test of the Windoo and competing products:**
**www.free.aero/en/contentsHTML/instruments-e/?page=42**

# LITTE CLOUD PLIE AU RALENTI


**Nice footage showing collapses filmed with a high speed camera, allowing you to admire every detail in slow motion.**
**https://vimeo.com/171085279**

# KORTEL KROSS

The first wing designed by the harness manufacturer Kortel is aimed at hike and fly competitions as well as vol bivouac. For Kortel, *'it offers the perfect compromise between high level performance and easy handling in strong conditions.'*

With an aspect ratio of 6.4, this C certified wing (or CCC depending on the size) remains compact and simple to manage. It has very good roll handling in the roll and can also make the most of difficult thermals in wind close to the ground.

www.korteldesign.com

free.aero MAGAZINE

## THE EDITOR'S OPINION

Kortel Design is not a typical French manufacturer. Having started with an activity, which for a long time was considered a niche market, lightweight harnesses, they have built up an international reputation as a harness manufacturer.
Large paraglider manufacturers like Nova have entrusted Kortel with the development and manufacture of their mountain harnesses. By developing their own paraglider Kortel don't have the same approach as Supair. This harness manufacturer started making paragliders with models aimed at professionals or the general public (tandem and school wings), whilst Kortel is staying in a very narrow niche market with the Kross.

The development of the Kross is also unusual: The Kortel team have made a wing which is perfectly adapted to their Kolibri harness. The latter being pretty roll stable, Kortel were able to make the Kross dynamic in the roll and it should, as a consequence, be very easy to handle.

When designing the Kross, Kortel worked with Nova, who with the Triton Light 2, offer a wing with very similar specifications. This no doubt gives a definite guarantee for the future success of the Kross, as far as the potential of this niche market is concerned.

# KORTEL KROSS

| KROSS - TECHNICAL DATA | | | |
|---|---|---|---|
| Manufacturer: KORTEL Web: http://www.korteldesign.com/spip/?Kross<br>Mail: info@korteldesign.com | | | |
| YEAR | XS | S | M |
| SIZE | 71 | 71 | 71 |
| CELLS | 21.9 | 23.7 | 26.3 |
| FLAT SURFACE AREA [m²] | 11.9 | 12.3 | 13 |
| FLAT WINGSPAN [m] | 6.4 | 6.4 | 6.4 |
| FLAT ASPECT RATIO | 3.40 | 3.55 | 3.85 |
| WEIGHT OF THE WING [kg] | EN CCC | C | C |
| CERTIFICATION | Bord d'attaque : Skytex 32 universal. 32g/m2<br>Extrados : Skytex 27 classic. 27g/m2<br>Intrados : Skytex 27 classic. 27g/m2<br>Cloisons (suspendues) : Skytex 32 hard. 32g/m2<br>Cloisons(non suspendues) : Skytex 27 universal. 27g/m2<br>Suspentes principales : Liros PPSL 191 / Edelrid 8000 U-120<br>Suspentes hautes : Edelrid 8000 U-70 / U-50<br>Suspente de frein : Edelrid 8000 U-50<br>Elévateurs : Aramid 12mm | | |

# AIR DESIGN UFOS CERTIFIED

Certification at Air Design: the UFO 21 single skin paraglider has been certified EN B and the UFO 18, EN C. Air Design point out that the C is solely due to the brake travel, the 'rest' is EN A and EN B.

www.ad-gliders.com

## THE EDITOR'S OPINION

free.aero MAGAZINE

Both the launch and the certification of the UFO 18 and 21 were very well done.

It's a good response to the criticisms that we raised in our previous comparative test of single skin wings.


At the time, the UFO, unlike the Niviuk Skin, behaved more like a 'mini wing' than a 'little paraglider', and was, as a consequence, a little less accessible and less flexible.

The design of the large sizes and their route to EN B or EN C-almost-B certification, is very interesting

If in addition, as expected, the company really launch a certified tandem single skin weighing less than 3 kg, that could be a mini revolution.

# ADVENTURE FUNFLYER 2 MONO/TANDEM

Adventure have finally brought out a new version of their successful Funflyer buggy. This buggy is made from stainless steel, titanium and carbon; the chassis is more rigid and there have been improvements in the detail like the nylon rings to reduce the vibration and the noise.

The whole geometry has been modified to give more comfort and more efficient steering during inflation and rolling. It is made for both solo and tandem flying. For flying solo, they obviously suggest the Tiger 160 (23 HP), or the Mini 3 evo (270 cc, 34 HP) which also propels the tandem.

Photos : Adventure

# ADVENTURE FUNFLYER 2 MONO/BIPLACE

## TECHNICAL DATA

Engine single seat:
Tiger 160, 23 HP,
Propeller 130 cm, thrust 70 kg
or
Mini 3 Evo 270, 34 HP,
3-blade propeller 130 cm, thrust 90 kg

Engine double seat:
Mini 3 Evo 270, 34 HP,
3-blade propeller 160 cm, thrust 125 kg

Fuel tank 23 l
Autonomy 4h/3h

www.paramoteur.com

The Funflyer 2 in Adventure's promotional video.
https://vimeo.com/168360284

Photos : Gildas

# THE BREATH OF THE WAVES

On the Atlantic coast of France, Gildas Love teases the waves with his paramotor. He uses the gust from the wave to help him fly, it has a lifting effect like soaring the edge of a cliff, and a horizontal current which allows him to fly faster. Despite there always being somebody close at hand on a jetski to save him, it's still a very dangerous game. Don't try this at home.

www.facebook.com/love.gildas

Photos: Jean Louis Lanne

# CHEAP PORTABLE TECHNO WINCH

Another very cheap winch project has been DHV certified and could therefore be commercialised in the short or medium term. The Winchbitch is a system which uses a car to tow and a single, fixed length cable, without a reel. This can be very dangerous: towing a paraglider behind a car, without being able to release the cable to reduce the tension if necessary, can end up with a lock-out. The result is like a kite nose diving and crashing. This has been the cause of fatal accidents.

Now, the activity has apparently become safe thanks to an automatic cutting device. The cable is completely unwound behind the car which has to drive at a good speed. If the tension becomes too much, the electromagnetic link between the cable and the car is automatically cut.

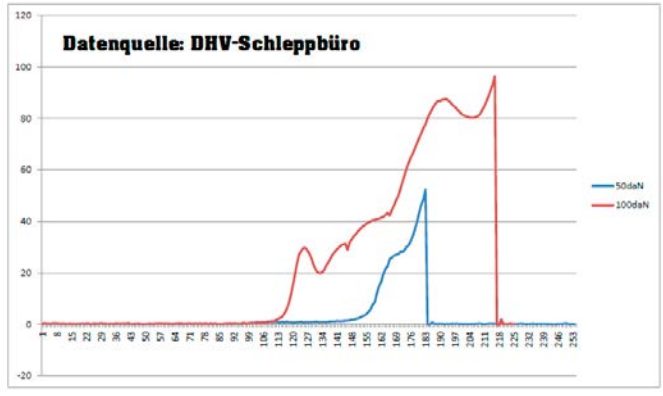
The whole thing weighs 8kg, is fed by a 12V car cigar lighter and costs about 1300€. Your own personal take-off to carry with you wherever you go.

www.winchbit.ch

The cable is fixed to the tow bar of the car (here with a spring balance to test it).

An electromagnet which is cut in case of overload.

Being cut automatically during DHV testing (DHV 05-0035-16 on the 2.2.2016).



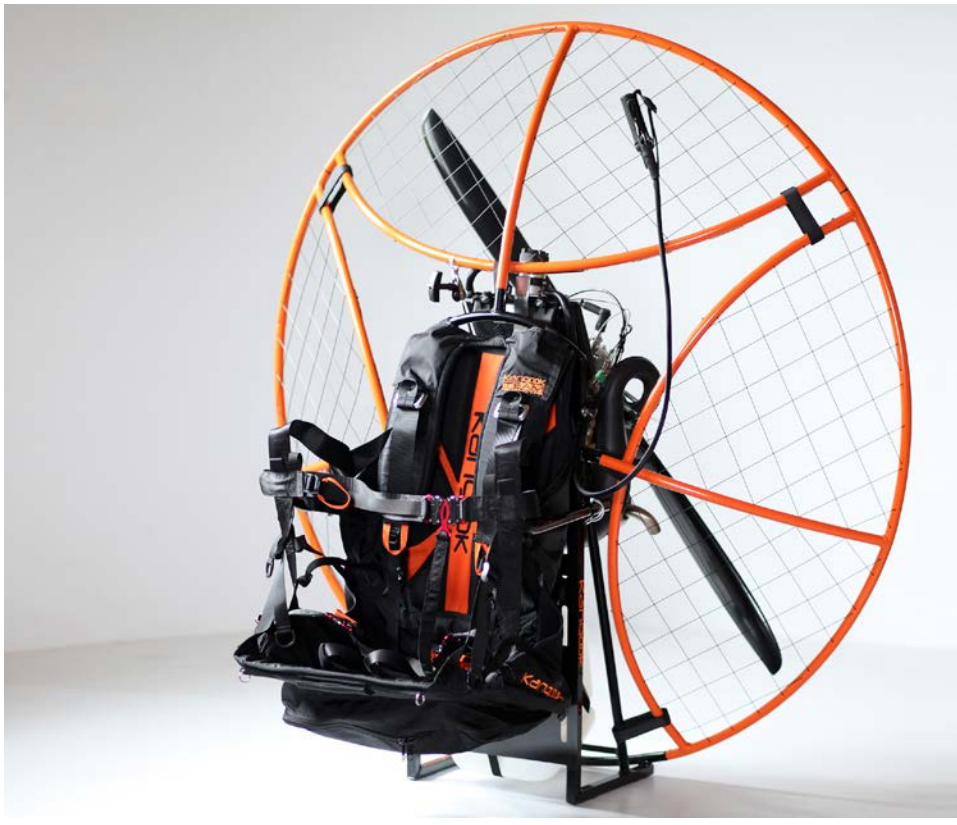

The driver can check the tension thanks to the coloured LED lights. All he has to do is regulate his speed so that they stay green.

Photos: Winchbitch

# KANGOOK - THOR 80

The Canadian manufacturer continues to surf the wave of success. In June they finished putting together their one thousandth machine. In addition, they now regularly fit the Polini THOR 80 to their chassis.

This little engine has shown its excellent power/weight ratio and its reliability.





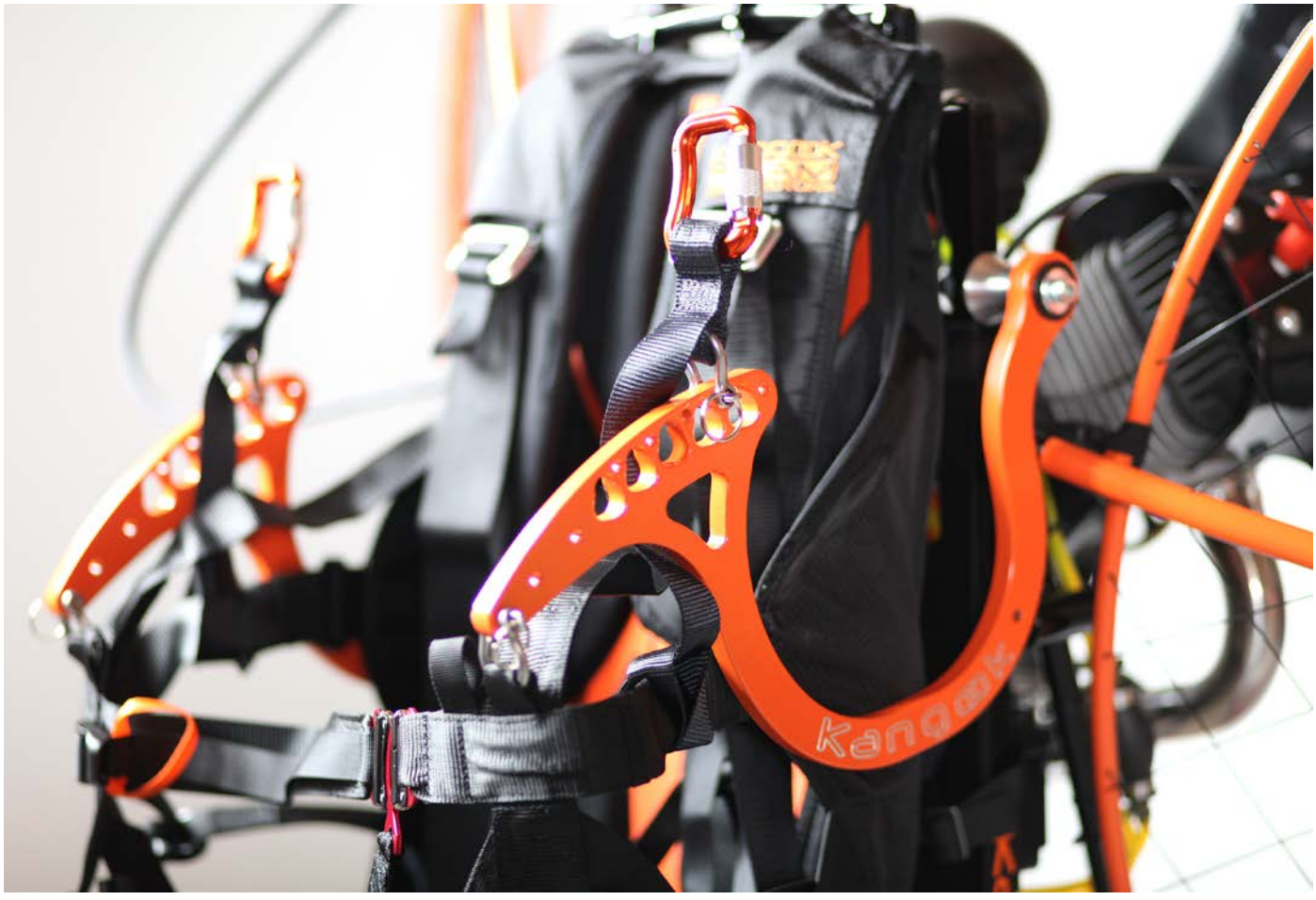
Photos : David Rouault, Kangook

Kangook also fit the new 'Light' version of the Corsair Black Devil. It's the same motor, but lighter thanks to more advanced machining.

The photo shows the sport version which uses lots of carbon and a quick attachment system for the propeller.

For more information have a look at their website:
http://www.kangook.ca/distributors


Photos: David Rouault, Kangook



# POLINI THOR 80, SMALL BUT POWERFUL.

POLINI THOR 80 is a real heap of technology. From the Polini engineering experience a new revolutionary engine is born, which combines surprisingly compact dimensions, extreme lightness, a powerful thrust and lifting power abilities. With its capacity of 86cc and its power of 17,2hp at 10.450rpm, POLINI THOR 80 is the ideal choice both for the beginners who approach the world of flight and for the aeronautic lovers who can trust on extraordinary performing qualities and reliability.

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# GROUNDED THANKS TO THE BUCKLES

This time it's the T-Lock and Clicklock buckles made by Charly/ Finsterwalder (HSi10) which are concerned.

*A problem with automatic buckles could prevent lots of pilots from using harnesses if they are more than four years old...*

At the beginning of June the DHV issued a safety notice concerning a large number of harnesses which have chest straps equipped with automatic T-Lock and Clicklock buckles (HSi10) made by the company Finsterwalder Charly. Numerous harnesses made by Advance, Ava-Sports, Apco, Finsterwalder & Charly, Karpofly, Sky Paragliders, Skytrekking, Sol and Woody Valley are part of the group affected as well as some harnesses used for paramotoring.

The buckle manufacturer, in collaboration with the DHV, has asked pilots to stop using harnesses thus equipped made (or more precisely, controlled on leaving the factory) more than four years ago.

Two incidents led to this: in March the DHV became aware of a fatal accident abroad where a pilot seemed to have fallen out of his harness when he came out of a seated position as he came in to land. A buckle seemed to have come undone. But as the information couldn't be checked due to communication difficulties with the authorities in the country concerned, the DHV couldn't confirm this theory.

Then, during an SIV course, a pilot had initiated a SAT. As he pulled on the riser, the chest buckle opened. The pilot managed to land safely, if a little scared. The problem concerns only the chest strap on Get-Up systems as well as on harnesses with classic T-Lock thigh straps. In fact, the chest buckles are, in both cases loaded cyclically, contrary to the thigh buckles which are hardly loaded in flight.

The problem: these diagonal load/ unload cycles can, in the long run, put wear on this piece of equipment. As a consequence, it is possible for them to come open unexpectedly when loaded. When testing certain old harnesses, the DHV found cases where the buckle opened just by being pulled by hand.

The risk concerns every harness with a chest strap thus equipped, and especially those which fasten with a Get-Up type system with two buckles on the chest strap (see explanations over the next few pages). In flight they are regularly put under tension then unloaded. And if one of them releases, the risk of falling out is greater. We tried to fall out of a Get-Up harness when a single buckle came undone. Yes, you can. It's also possible to fall out of a harness with classic thigh straps (with a T system, 'T-Lock') if the chest strap releases, but due to the tension in the thigh straps, it's a bit less likely.

**WHAT'S THE SOLUTION?**

First of all, check whether the harness is one of the ones concerned. Independence was the first harness manufacturer to relay the safety notice by listing their harnesses concerned, followed by Advance and later Swing, Charly and Woody Valley. For others, you can recognise the types of buckles which don't have a marking by comparing them to this picture. If the harness is one concerned and it is more than four years old, Advance and Woody Valley (Germany) have suggested the following temporary solution: add a 60 to 80 cm sling, with a strength of at least 15 kN, between the two main karabiners to back up the chest strap, just in case.

Replacing the buckles, on the other hand, doesn't apparently seem feasible because essential elements would have to be unstitched and then resewn.

**The problem apparently comes from wear at the points indicated on the right. Paradoxically, by filing these points precisely as defined by the manufacturer, thus removing material from a worn piece, the buckles could return to being as good as new and close correctly. In the meantime, some harness manufacturers recommend adding a climbing sling for extra security; see the photo below from Advance.**

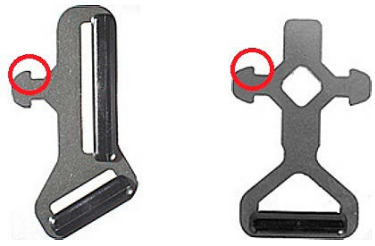


Photo:Finsterwalder Marques: Lucian Haas / Lugildz

Photo:Advance

The buckle manufacturer Finsterwalder is, in the meantime, working on another solution: file the male part of the buckle to give it sharper angles. If this is done by professionals according to the manufacturer's recommendations, it seems that the fastening would get its previous 'bite' back.
Watch this space...

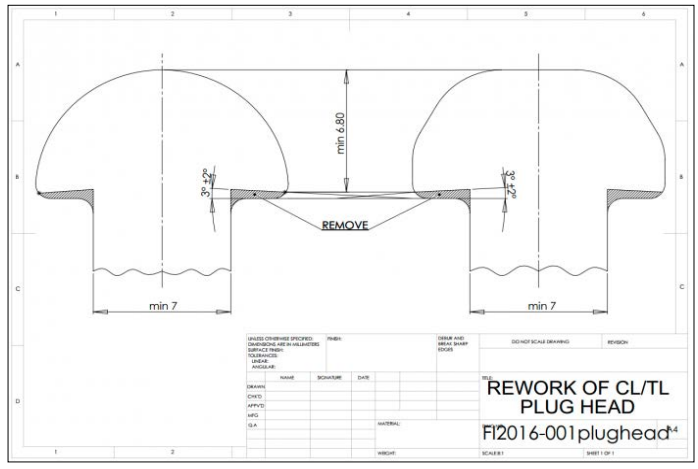



Photo et illustartion : Finsterwalder

# ONE OPEN BUCKLE CAN BE ENOUGH

The harness in the pictures is not affected at all by the problem, but we used this harness with two fastenings to simulate the opening of a single buckle on the chest strap. What happens is clear: yes, a single chest buckle giving way under the weight of the pilot during a manoeuvre can be enough...

**A harness with a Get-Up system. This harness isn't affected by the problem because its flat buckle fastenings can't open all by themselves.**

**Even when loaded, as long as the two buckles are fastened, the pilot is obviously held securely in place.**

**A buckle coming undone isn't a big problem as long as the pilot remains sitting.**

Photos: Véronique Burkhardt / voler.info free.aero

**On the other hand, if the buckle opens due to the load of the pilot leaning forwards, the system will open wider.**

**In particular, during a violent manoeuvre, the pilots arms can easily slide out of the harness.**

**The pilot is suspended by only a single strap, and one that is loosely done up, in the case of a Get-Up system.**

# T-LOCK VS. GET-UP

*It's worth remembering that there are several variations for buckling up harnesses. Two modern ones, which are very widely used, are the T-Bar (or T-Lock) and the Get-Up system, introduced in particular by Woody Valley.*

## CLASSIC T-LOCK

Here's a harness with a T-Lock fastening. (The model in the photo isn't affected by the buckle problem).

There are four buckles: one on each thigh and two on the chest strap. Several years ago, the chest strap only had a single buckle and didn't have a vertical strap linking it to one of the two thigh straps. Today, this system (T-bar) has been adopted by all the manufacturers for safety reasons. It is impossible to do up the chest strap without it. The pilot is therefore held in the harness, even if he has forgotten to do up the thigh straps. (Except if the T-Bar strap has been passed around the outside of the thigh, which has already happened). There are big differences between the heights of the thigh loops. On some harnesses, they come from the seat (the legs are strapped in tighter). On others, they are attached very high up (the legs have lots of freedom, making it nearer to the Get-Up system).

ADVANTAGES: With a classic T-Lock system compared to a Get-Up system, when ground handling, and particularly when facing the wing, the harness is more comfortable to wear. There are more buckles and the pilot is held in better in case one comes undone.

DISADVANTAGES: More buckles to fasten. The thigh straps are also a hindrance to long strides during take off. If it is badly adjusted this system doesn't allow you to sit down as easily after take off as a Get-Up system.

## GET-UP

Photo: Véronique Burkhardt / voler.info free.aero

Here's a harness with a Get-Up fastening. (The model in this photo isn't affected by the buckle problem either).

There are only two buckles. The system is therefore very fast and practical to do up. It leaves the legs lots of freedom of movement; it's very practical during take off and very comfortable in flight. In the air, as long as the straps aren't adjusted too short (giving a possible cross bracing effect), there is practically no negative effect on the steering; on the contrary, the freedom of leg movement can favour dynamic movement.

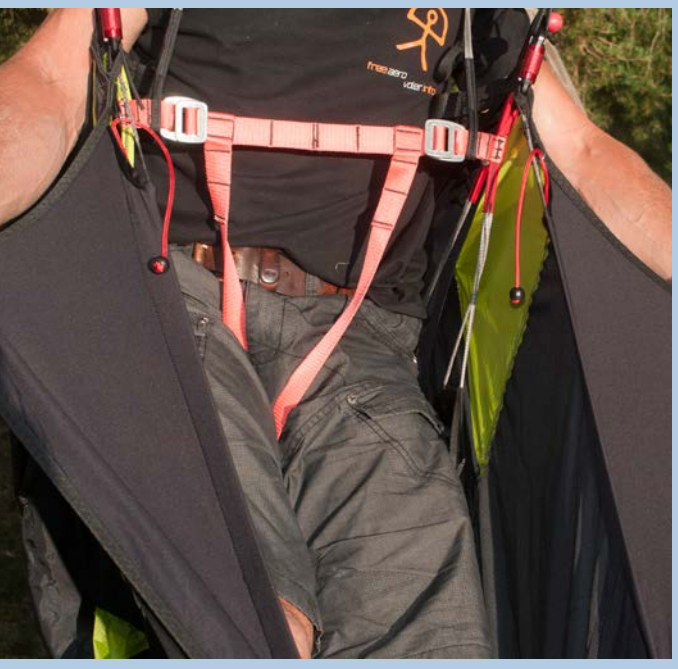
Safety at take off is very high. It is almost impossible to take off without correctly doing up the two buckles. On the other hand, if one buckle releases, the pilot is a lot less securely held in (see previous page).

On the other hand, the biggest disadvantage of the Get-Up systems is their discomfort to male pilots during ground handling sessions. This also depends on the geometry of the harness. It is therefore very important to try the harness before buying it, especially when ground handling. More and more top of the range XC harnesses are based on this system, particularly for comfort in flight and for freedom of leg movement.

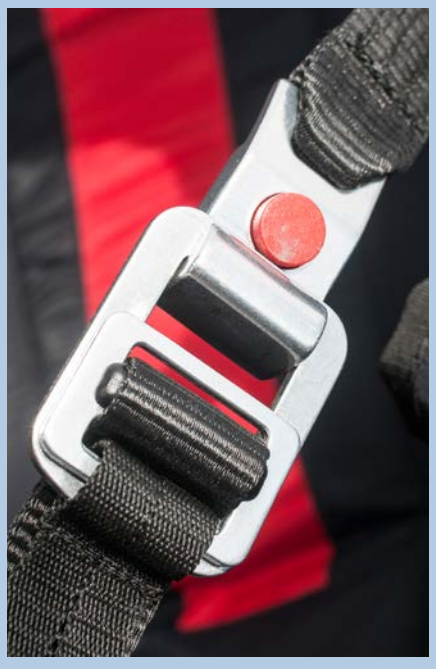
# SOME BUCKLES AND FASTENINGS...


The Austrialpin Cobra double buckle on a T-Lock chest strap on the Skyman Coconea. The Austrialpin buckles have been tried and tested but aren't totally exempt from flaws. According to a safety note issued in January 2016, 1 buckle in every 2 million could have a rivet fault.

The Advance Lightness 2 (tested by free.aero in 2015) has a Get-Up system with two lightweight flat buckles. Very reliable!



The Skywalk Range Air (tested by free.aero in 2015) is also equipped with a Get-Up system with two flat lightweight buckles.



This type of buckle, also made by Finsterwalder and used by several makes, can't open under tension. On the other hand, if the button releases, the buckle could open when the strap is not taut. A safety notice was issued concerning the rare cases where the button could come out of its housing.

The flat buckle on a Woody Valley Wani Light harness: definitely an advantage. There is no mechanism which can wear out and it's almost impossible for it to open by itself. (Although it seems that on some older harnesses there were rare cases of the plate managing to find its way out all by itself if it was too loose.)

In any case, on the Supair Kinder harness pictured below, it is reassuring to know that the child tandem passenger is securely strapped in.

Photos : Véronique Burkhardt / voler.info free.aero

Photos: Véronique Burkhardt / voler.info free.aero

The ultralight String harness from Neo fastens thanks to two buckles that the pilot threads through the main karabiners. It's both practical and safe. This way the harness is comparable with a Get-Up system, yet it's very comfortable and doesn't press anywhere.


Photos : Véronique Burkhardt / voler.info free.aero

The lightweight Apco Split-Legs harness is also halfway between the Get-Up system and the classic system. A very comfortable and efficient harness used on paramotors. You can also read our test here: http ://www.voler.info/cms/contentsHTML/Sellettes_Fepure/?page=46


It also now comes in XL. A new option is the airbag which inflates in the airflow. www.apcoaviation.com/products.asp?section=harnesses&product=pm_Low_split

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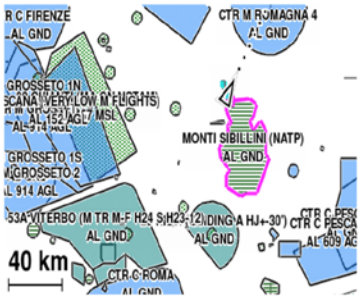




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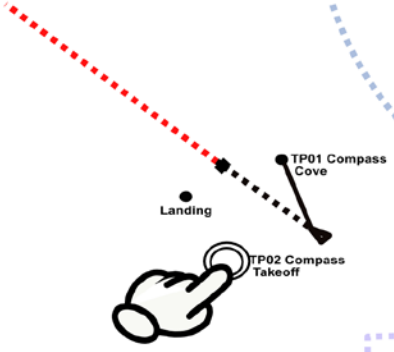
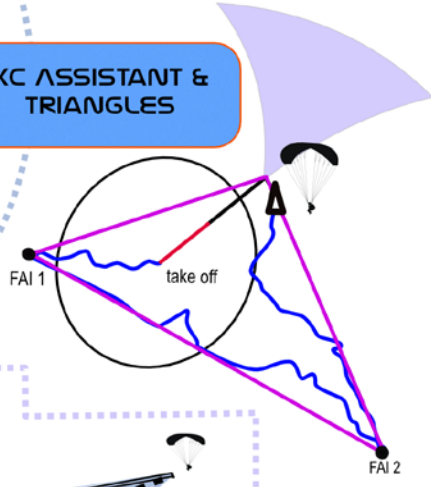



ALL-IN-ONE XC COMPASS

**GLIDE OVER TERRAIN**

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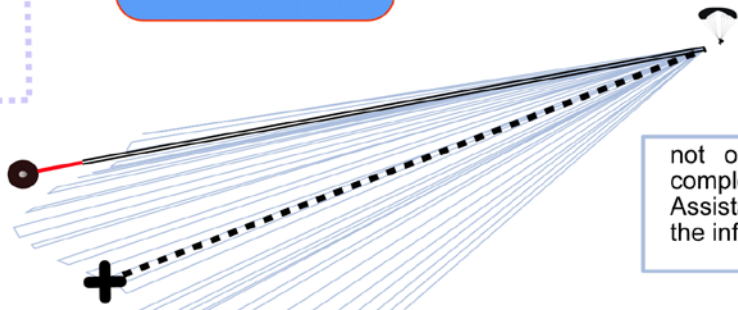

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# The XC - Instruments

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# CONTROLLING WITH YOUR FEET!

## PITCH CONTROL WITH THE ACCELERATOR

*The accelerator isn't just a tool for gaining a few kilometres per hour allowing you to fly faster, it can also serve to manage the pitch during different phases of the flight.*

*By Pascal Kreyder*

Let's start with a few reminders about the correct use of the accelerator whilst flying. As a prerequisite, obviously you need to have mastered pitch control using the brakes correctly, positioning in the air mass and the progress over the relief.

But before putting this technique into practice, make sure that your accelerator is correctly adjusted.

## ADJUSTING YOUR ACCELERATOR

Ideally, it will have three positions.
1. Generally the strap used to catch the accelerator with your heel in the cocoon or under your footrest already lets you accelerate by 2 or 3 centimetres. If this isn't the case, adjust it accordingly.

2. The first bar should be able to be held with only one foot more or less fully outstretched, without tiring you out too much and without shuddering. It must be adjusted to allow you to put your second foot on the second bar.

The cocoon and the accelerator need to be adjusted so that your feet can be positioned as follows:
• The toe of the first foot always holds onto the cocoon, no matter whether the accelerator is being used or not.
• The heel of the same foot can at the same time push on the lower bar of the accelerator. This way the pilot can play precisely with the accelerator for average acceleration using the first bar, whilst keeping the cocoon rigid so that it doesn't flap about in the wind.
• Put the other foot on the second bar of the accelerator (the highest), use it to push down fully on the accelerator for maximum speed.

3. Finally, pushing on the second bar should allow the entire travel to be used.

A museum piece: when weight was of little importance...

You can adjust your accelerator by attaching your harness to a doorway (above), as long as you measure the height on the riser, between the attachment point and the accelerator hook. Once in the air, you need to fine tune the setting.
If you change wings often, an accelerator which is adjustable in the air from FreeSpee (www.free-spee.com) is very practical. It is now available in a two bar version as well (not tested).


## MANAGING THE PITCH WITH THE ACCELERATOR IN A THERMAL

First, using it going into a thermal: in the transition, if you are accelerating with the first bar or less, and you go into a thermal that you want to use, your wing will experience a little slowing down as you go in, or indeed a clear nose-up if it is strong. In which case, all that is required is to increase the acceleration to limit the nose-up effect.

Once inside the thermal, you need to gently release all the acceleration so that you can use the rising air.

Releasing the accelerator will release energy in the form of extra lift.

Work the entry to the thermal with the accelerator.

## COMING OUT OF THE THERMAL

Here, the foot work is more delicate. However easy it is to use the accelerator entering a thermal, even if it's strong, you need to have a good dose of experience to use it coming out of a medium or strong thermal.

In fact, if the thermal is more than 2.5 m/s, the exit will cause a surge forward, probably big enough to need damping with the brakes. You can replace the damping with the brakes by accelerating the wing at the end of the last turn (inside the thermal). This seems contradictory, but it isn't because the surge forwards, that we need to brake with our hands after coming out of the thermal, is the equivalent of accelerating.

But accelerating before the exit, can be very efficient. To do this, increase the diameter of the last turn and make sure you exit the thermal by finishing with an almost straight trajectory. Once in the zone of descending air (outside the thermal) and your wing pitches forwards, you'll need to release the accelerator.

Once again, releasing the accelerator will release energy and therefore restore a bit of altitude. If the pitch is really strong, you'll need to add a bit of brake or simply slow the movement with a pull on the Cs. Firstly though this technique requires you to be properly positioned in the thermal so that you don't fall out of it.

On your feet!

**Exiting the thermal needs to be anticipated so that the accelerator can be used efficiently just beforehand. The aim is to counter the dive with a pitch backwards.**


On a paramotor, the competitors constantly use the accelerator during slalom courses. The steeper the corners are around the pylons, the greater the energy accumulated when exiting, and the greater the tendency to pitch backwards. To avoid that, they push on the bar coming out of the turn. This allows them, whilst countering the pitch backwards, to regain in the form of speed, the energy accumulated during the turn.
A great time saver!

Photo : Davy Faure / Gingliders

TEST

# GIN CARRERA +

# *The GIN Carrera Classic versus the Carrera Plus: we tested the differences.*

*By Alfredo Briccola*

The Carrera 'Classic' has had a lot of success following its launch in 2014. An EN B with an aspect ratio of 6.2 and very high performance for this category of wing. And that's just the problem: the manufacturer really did say that it's an EN B placed very high in its category. Lots of pilots who didn't yet have the required level bought it... and sometimes felt out of their depth. GIN especially targeted XC pilots used to EN C but looking for a bit more of a safety margin than that offered by the EN C class. And visibly, the Carerra is well placed in the rankings of XContest and others!

**FROM THE CLASSIC TO THE PLUS**

In 2015, GIN brought out the 'Plus' version of the Carrera. The Plus is still top the EN B range, but isn't a castrated version of the Carrera Classic.

Photo : Alfredo Briccola

Photo : Jérôme Maupoint

The difference is in the trim, which comes from replacing all the risers and lines. A kit to update the Carrera classic is available. The most visible difference: The lines on the 'Plus' are sheathed in the lower part as opposed to the unsheathed 'racing' lines on the Carrera. The curve on the Carrera Plus is more pronounced to stabilise the external parts of the wing and the pitch.

The risers have been modified; they are easier to work with, in particular facing the wing. The majority of our flights were in strong wind. In those sorts of conditions, the As mustn't be pulled too much during inflation, as the wing could come up in a rosette (front horse shoe). You really need to stop it above your head, especially if the take off is steep. On the other hand, no doubt thanks to the new trim, the wing never does big ears during take off.

FLYING

During our flights in Switzerland and Mongolia most of the time there was wind, laminar or turbulent, and there were all sorts of different thermic conditions. The wing was surprisingly calm, although it seemed slightly slower than the Carrera classic. The stabilos being calmer, flying in turbulence is more comfortable. The glide is clearly always that of a wing in the class above, the same being true for the acceleration.

The controls aren't as hard as on the classic. During long periods of soaring very close to a long grassy ridge, we were able to gauge the great precision of the controls which reacted almost without delay when combined with the accelerator. This wing is pleasant in the turns.

Photo : GIN/ Boisselier

THERMALS

Going back into the thermal, the wing hesitated slightly before going into the thermal. The Carrera Classic had a bit more bite, but you get used to that. When coring thermals of more than 3 m/s, the wing isn't as hard as concrete, but a bit lively. Compared to the previous version, on the other hand, it is calmer and more balanced. Despite the high aspect ratio of this wing, you can get it to bank steeply in narrow thermals. Exiting thermals is more damped than with the Classic version.

In weak thermals, it appears very efficient and allowed several low saves when we were very near to landing out.

Overall, the wing is more damped than the previous model, but it isn't more inert as a result. The Carrera Plus also always gives clear feedback about the aerology, but without being uncomfortable for the pilot.

Photo : Alfredo Briccola

| CARRERA+ TECHNICAL DATA | | | | | |
|---|---|---|---|---|---|
| Manufacturer: Gin - Web: http://gingliders.com Mail: france@gingliders.fr | | | | | |
| YEAR | 2015 | 2015 | 2015 | 2015 | 2015 |
| SIZE | XS | S | M | L | XL |
| CELLS | 59 | 59 | 59 | 59 | 59 |
| FLAT SURFACE AREA [m²] | 21.58 m² | 23.50 m² | 25.50 m² | 27.60 m² | 30.01 m² |
| PROJECTED SURFACE AREA [m²] | 59 | 59 | 59 | 59 | 59 |
| FLAT WINGSPAN [m] | 11.57 m | 12.07 m | 12.60 m | 13.08 m | 13.64 m |
| PROJECTED WINGSPAN [m] | 9.36 m | 9.77 m | 10.17 m | 10.60 m | 11.03 m |
| FLAT ASPECT RATIO | 6.2 | 6.2 | 6.2 | 6.2 | 6.2 |
| PROJECTED ASPECT RATIO | 4.75 | 4.75 | 4.75 | 4.75 | 4.75 |
| ALL UP WEIGHT [kg] | 65-85 kg | 75-95 kg | 85-105 kg | 95-120 kg | 110-135 kg |
| WEIGHT OF THE WING [kg] | 4.9 kg | 5.1 kg | 5.6 kg | 5.9 kg | 6.3 kg |
| CERTIFICATION EN/LTF | B | B | B | B | B |
| Material | Porcher Skytex 38 Universal 9017 E25, 38 g/m²<br>Porcher Skytex 40 Hard 9017 E29, 40 g/m² | | | | |
| PRICE [€] | 3 850 | 3 850 | 3 850 | 3 850 | 3 850 |

The ears are easy to do, but don't stay in; you have to hold them in contrary to its predecessor, where they even had a tendency to cravat. When landing, another difference is evident: the pitch backwards is better which allows you to finish with a long flare. You can also go down vertically very easily by pumping the brakes.

## SUMMARY

Slightly calmer, whilst at the same time keeping the basic essence of this EN B (very close to C) wing. It remains a model designed for experienced pilots but with improved comfort.

# TEST BGD CURE M

*The Cure is the high end EN C wing from the manufacturer Bruce Goldsmith Design. It is placed above the Tala. A lot of the qualities and undeniable performance of the Cure come from Bruce Goldsmith's own 3D-Shaping, the Cord Cut Billow.*

*By Cédric Nieddu*
*Photos: Certika and the manufacturer*

Upper surface in Dominico N30 and lower surface in Porcher 27 gr/m2 guarantee a low weight (about 4.7 kg for the M).
The SharkNose is fairly pronounced.

## BUILT TO GLIDE

It has been well known for a long time that Bruce Goldsmith produces innovative internal structures which are complex in their design. But often this sort of architecture remains invisible because it is in the very heart of the wing. With the Cure it is finally possible to see the designer's talents: The leading edge 'Cord Cut Billow'. A complex cut of the upper surface at the level of the SharkNose gives a very aesthetic leading edge. Later on we'll see that it gives the wing a balance between 'maintaining its profile and resistance turbulence' which allows the pilot to maintain a high level of accelerated glide.

## AN EFFICIENT INFLATION IN ALL CONDITIONS

The minimal openings along the leading edge make it look as if it would be difficult to inflate in nil wind. Not true. Even without wind the wing scoops without resistance, and comes up in a regular fashion. The wing tips fill out when you brake lightly and the lift appears without any surprises. The high aspect ratio simply requires the pilot to set up very symmetrically on the ground. On a day with wind, with quarter of the wing nicely orientated with the wind, the wing always inflates progressively. You feel the general balance of this wing and controlling it on the ground is obvious.

In conditions where the wind is strong, the Cure doesn't lift you up. This wing gives its pilot confidence even before getting airborne.

## GLIDE ANGLE AND GLIDING

A balanced wing which performs well. In calm air it has a glide ratio of 11 to 40 km/h. Compared to other 'reference wings' in this category, the glide angle remains very close but with a slightly superior glide.

In calm air, lots of wings are similar, but the glide allows it to keep a more marked advantage in a lumpy air mass.

An example in another category of wings: Julien Wirtz, who recently came second in the 2016 Super Final, told me that, in the World Cup, the wings from different manufacturers were very close in terms of pure performance but today, the Enzo 2 makes a big difference in terms of results thanks, in fact, to tiny differences in performance in the into-wind glide.

The high resistance of the Cure's profile lets the pilot conserve the glide without using the rear risers or the brakes. In the end the real performance of a wing is measured here, and puts the pilot's ability to let it fly to the test. With the Cure, each transition benefits from acceleration so it maintains a high level of performance and comfort in this configuration. At 50 km/h it is one of the highest performing wings in all the categories put together.

**THE TURN**

With an aspect ratio of 6.75, a figure normally reserved for EN D, one would assume that the turn wouldn't be great. It's true that an Artik 4 turns better than an Icepeak 8 and a Delta 2 better than an Enzo 2. But that doesn't mean that you would be more efficient with a Delta 2 than an Enzo 2. You can compensate for a bigger turn radius with better energy retention or a polar curve that is smoother, more regular and therefore more efficient.

The Cure is a wing which is very efficient in thermals even if the radius of the turn must remain a bit larger than those of other EN Cs in order to be as efficient as possible. In a configuration with very little brake, you can maintain in very weak thermals. And when the climb rate accelerates, you have no problems in putting it 'on its edge' to stay well centred in the core.

Cédric Nieddu's tests are, as always, recorded on video.
https://vimeo.com/167858192

The controls give the impression of firmness right from the beginning of the brake travel, but they aren't physical. This is typical for most recent wings with a SharkNose.

FLIGHT INCIDENTS.
The Cure is very high aspect ratio. Theoretically, the higher the aspect ratio, the higher the risk that it won't recover nicely if you have a big blow-out…But I have to admit that the behaviour in flight incidents of the Cure is very good. The Cure is a real EN C whatever its aspect ratio might make you think.

• Frontal : The profile rebuilds itself automatically without any parachutal phase which could be uncomfortable for the pilot. .

• Asymmetric: In the case of a big collapse, greater than that measured during the certification, the wing goes off on the closed side with quarter of a turn but, if the pilot isn't sleeping and counters just with the harness, the rotation slows leaving lots of time to counter it with the brake. There are no nasty surprises with this wing.

• Stalling with the brakes: The wing tips really go well back before the profile stalls completely. Once stabilised, the wing wants to refly by pulling the pilot's hands up. It's a parameter which isn't taken into account during certification (or only in the general feeling that the test pilot has for the behaviour of the wing) but which is very important. During the parachutal phase, some EN C wings have to have the brakes fully released before they'll refly. The Cure on the other hand wants to refly, and even reflies with some brake. Thanks to this, over-reaction will be forgiven. We're all capable of over-reacting when we're taken by surprise. This makes the Cure more accessible than its aspect ratio would lead you to think.

• Full spin: The rotation is fast, between 90 and 270°, and then the wing tip on the outside of the rotation curls up slightly slowing the speed. The pilot then has a fairly obvious way out and the surge forwards can be controlled no problem. It's worth bearing in mind that during my many tests outwith normal flight, I never had a cravat.

**CONCLUSION.**
Don't be put off by the aspect ratio of the Cure, it is correctly placed in its category of XC wings certified EN C.
It's easy to take off in all conditions; it's super efficient in thermals and keeps its glide even in bumpy air. With these characteristics, there is no doubt that it's possible to do the same high performance flights as on a wing in a higher category.

| CURE - TECHNICAL DATA | | | | |
|---|---|---|---|---|
| Manufacturer: BGD Web: http://www.flybgd.com/ Mail: bruce@flybgd.com Tel: +33 (0)493 36 56 57 | | | | |
| YEAR | 2015 | 2015 | 2015 | 2015 |
| SIZE | S | M | ML | L |
| CELLS | 108/60/118 | | | |
| FLAT SURFACE AREA [m²] | 21.20 | 23.00 | 24.88 | 26.83 |
| PROJECTED SURFACE AREA [m²] | 17.69 | 19.20 | 20.77 | 22.39 |
| FLAT WINGSPAN [m] | 11.96 | 12.46 | 12.96 | 13.46 |
| PROJECTED WINGSPAN [m] | 9.27 | 9.66 | 10.05 | 10.43 |
| FLAT ASPECT RATIO | 6.75 | 6.75 | 6.75 | 6.75 |
| PROJECTED ASPECT RATIO | 4.87 | 4.87 | 4.87 | 4.87 |
| ROOT CHORD [m] | 2.18 | 2.27 | 2.36 | 2.45 |
| ALL UP WEIGHT [kg] | 60-80 | 75-95 | 90-110 | 105-125 |
| CERTIFICATION | EN/LTF-C Ongoing | EN/LTF-C | EN/LTF-C Ongoing | EN/LTF-C Ongoing |
| MATERIAI | Dominico N30<br>Porcher 7000 Universal 27g/m²<br>Porcher Skytex | | | |
| PRICE [€] | 4 250 | 4 250 | 4 250 | 4 250 |

TEST

# SWING MITO
# MYTH OR MAGIC?

*With the Mito, Swing are for the first time offering a production wing equipped with RAST technology which is supposed to bring impressive safety advantages.*

free.aero *checked the result.*

*Pilots: Cédric Nieddu and Sascha Burkhardt*

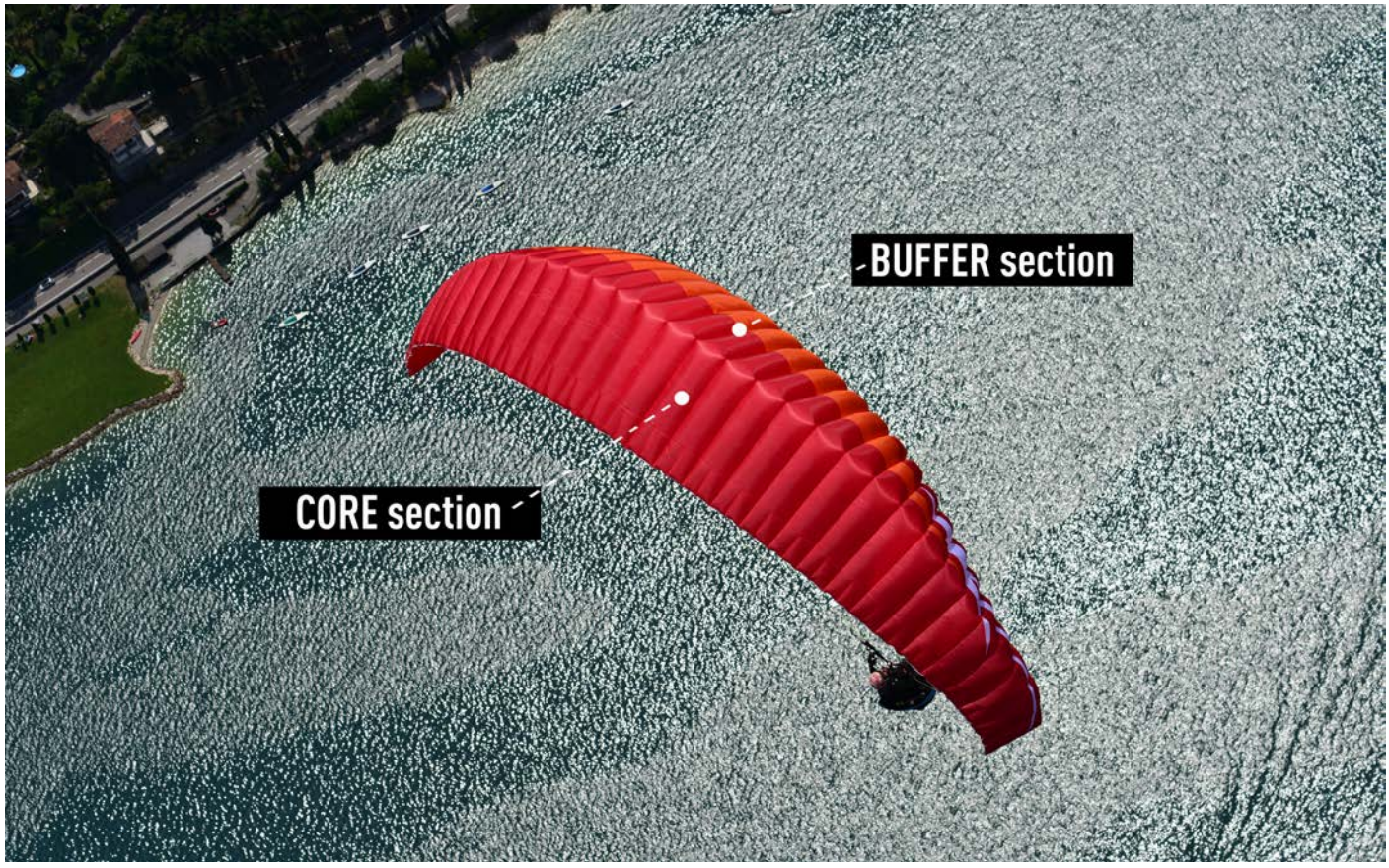

Photos : Véronique Burkhardt Pilote: Sascha Burkhardt


Photos : Véronique Burkhardt

The RAST system rib is visible on this photo in the front third of the wing. You can also see the use of mini-ribs on this EN A.

The Mito is the first wing, followed by the Twin RS tandem, to be produced with Swing's RAST system. It consists of a rib which goes the length of the paraglider in the sense of the wingspan. With the help of valves, the manufacturer can define the speed this part fills, for example during take off. The rear part also empties less quickly if there is a collapse. So the rear part of the wing becomes the 'Core Section', constantly well inflated and load bearing, and the 'Buffer Section' at the front is the part which empties first during a collapse. This system is supposed to, amongst other things:

- Favour inflation as a priority in the front part of the wing giving a more even inflation.
- Stop the wing overflying during inflation.
- Calm the collapses by favouring smaller collapses.




Manufacturer's photos: A 'frontal' sequence on a Swing prototype equipped with a RAST system. The reinflation is progressive; it's actually an advantage which was confirmed during our tests.

- Reduce the loss of altitude after a collapse.
- Reduce the risk of going into a spiral after a collapse
- Reduce the dive after a collapse or a stall
- Guarantee the wing having better stability in other extreme manoeuvres
- Allows the aspect ratio to be increased.

During the certification load test, the Swing team made another discovery: at 20 G, therefore at more than 18 000 daN, the Mito S didn't explode as any other wing would have done. Apparently the rib helps to maintain stability and strength by spreading the big overload over time. We were particularly interested to see how the Mito behaved in the air, especially as a beginner's wing, as this technology looked miraculous.

**CONSTRUCTION**

As far as the manufacture was concerned, there was nothing to say; it's the quality that we expect from Swing. The wing has some details especially for beginners: colour coding for the brakes along with the front risers and the Bs being clearly marked.


SWING


**Cédric's tests above water confirmed it to be an excellent EN A wing. But for collapses induced by pulling on the risers, the difference with a comparable wing without a RAST system, wasn't very obvious.**
**Speeds measured for an all up weight of 90 kg: minimum speed 24 km/h, trim speed 37-38km/h, accelerated speed 47 km/h.**
**https://vimeo.com/170365331**

## SWING - MITO TECHNICAL DATA

Manufacturer: Swing Web: http://www.swing.de/mito-en.html
Mail: info@swing.de Tel: +49 (0)8141 32 77 888

| YEAR | 2016 | | | |
|---|---|---|---|---|
| SIZE | XS | S | M | L |
| CELLS | 34 | 34 | 34 | 34 |
| FLAT SURFACE AREA [m²] | 23 | 26 | 29 | 32 |
| PROJECTED SURFACE AREA [m²] | 19.94 | 22.54 | 25.14 | 27.74 |
| FLAT WINGSPAN [m] | 10.56 | 11.22 | 11.86 | 12.45 |
| PROJECTED WINGSPAN [m] | 8.57 | 9.11 | 9.62 | 10.11 |
| FLAT ASPECT RATIO | 4.85 | 4.85 | 4.85 | 4.85 |
| PROJECTED ASPECT RATIO | 3.68 | 3.68 | 3.68 | 3.68 |
| ALL UP WEIGHT [kg] | 55 - 80 | 70 - 95 | 85 - 110 | 100 - 130 |
| WEIGHT OF THE WING [kg] | 4.8kg | 5.2kg | 5.6kg | 6kg |
| CERTIFICATION | LTF - CEN : A | | | |
| PRICE [€] | 3 000 | | | |

Equally unusual, the attachment of the brake handles; see further on.

TAKE OFF
The RAST system, in other words this extra rib inside the wing, is hardly noticeable when you unfold the wing. During take off, on the other hand, you can really see that the wing comes up safely and very progressively.Excellent behaviour, except that we don't have any means of knowing if that comes from the RAST system or if it's a wing where all the other parameters have been well thought out. The wing stabilises equally nicely above the pilot but, when the wind is strong, obviously there are no miracles; you need to brake it too. After inflating, facing the wing, it is very easy to handle, either with the brakes or the risers.

During these games, in a gust of particularly strong wind, the pilot was pulled off his feet with the wing skewed and an ear closed. However he was able to easily control it like this and calmly turn back round. With a less well behaved wing, that could

Above, the unsheathed lines are very thin, but remain easy to untangle

The rods form a light SharkNose

A classic: shortening the trailing edge when braking

A large opening to get rid of everything which, after a while, has got caught in the cells ...

have all ended up in the bushes behind launch. The Mito gives confidence.

Load take up and level flight: very good, it takes up quickly, and demonstrates a fairly good glide for an EN A. When entering thermals the pitch is well damped.

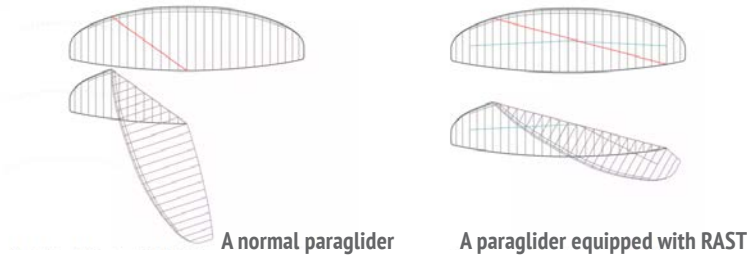
COLLAPSES...

For SIV manoeuvres we once again called upon Cédric Nieddu, one of the most experienced pilots in the subject. He performed all the classic manoeuvres, recorded on video. His report was interesting: yes, it's an excellent EN A wing in all respects but, as far as induced collapse are concerned, for example, he couldn't detect a link between the (very good) behaviour and the RAST system. So is the Mito, with its so-called qualities due to the RAST system, a myth? Perhaps not, because after a stall, for example, the wing actually reforms more progressively. Here too, it isn't possible to say for certain that it is thanks to this innovation, but this progressive reconstruction is a good safety feature.

PEDESTRIAN FLYING

After Cédric's flights we took up the gauntlet in the Pyrenees and flew in fairly average thermic conditions. This is where, in fact, we really got the impression that during a real collapse compared to a provoked collapse, the wing folded with a slightly smaller angle of closure. This could be one of the benefits that Swing attribute to the RAST system.

Provoked collapses are different from



A normal paraglider A paraglider equipped with RAST

According to Swing, the rear compartment decreases the angle of side collapses. This is good because the greater the angle, the greater the tendency to turn. First impression after a few flights: at least with the collapses that we had, it seems as if it does perhaps work.

# SWING MITO

unprovoked ones. Collapsing a wing by pulling on a riser isn't the same thing as seeing a wing collapse due to a gust which reduces the angle of attack to being less than acceptable for a non-rigid profile. Whether that's thanks to RAST or not, in turbulence, the Mito seemed very reassuring and smooth during the flights that we were able to do. It also made us want to play in slightly more virulent thermals which we were able to use more efficiently. It will be interesting to check the theories during other flights and to understand whether the Mito owes its qualities to the RAST system or not. In any case, it's a very good EN A, which is part of this new generation of EN A wings which the grand majority of pilots will keep for a very long time.

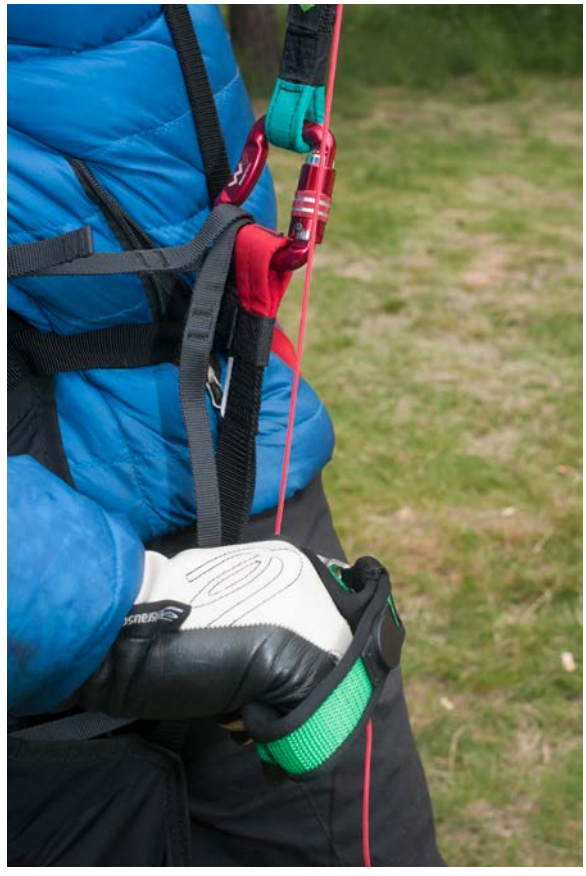
**Lots of well thought through details for beginners: clear left/right differentiation by colour code and by marking, both on the brakes and on the risers.**




Photos : Véronique Burkhardt

The brake handles can be used normally or attached specially for beginners, on the right.


The point of this knot: as long as the beginner pilot is forced to keep their hand vertical, they generally can't stall, even by pulling the brake right down. It's only when flaring that he is authorised to turn his hand horizontally to be able to stall. (right).



Whether with ears or after a collapse, this wing always remains very stable and easy to control.

TEST
EXPRESS

# AIRCROSS DOUBLE U

*Paul Amiell has developed a tandem for AirCross. Before we give the full details in our future 'Special Tandem' article, here are a few initial impressions...*

The first thing that tandem pilots ask of their wing, especially if it is for professional use, is a problem free inflation, no matter what the wind conditions. For the Double U, this is the case.

The AirCross make, originally known especially for their racing wings, has progressively opened up to models for the wider public. For the tandem, it's the same. After the U Share in 2003, a performance tandem for XC flying, AirCross brought out the Double U in 2015, aimed at a large range of uses, from amateur tandem to the demanding needs of the professionals.

Typically, for this type of wing, the requirements are 'very easy take off, great to fly and maximum safety'. Nice and solid is also part of the specifications and mandatory for professionals and clubs.

Paul Amiell, the designer at AirCross, has obviously put leading edge rods in this wing and has taken care with the internal construction.

With the rear risers, there are trimmers for accelerating gently; a foot accelerator isn't anticipated (normal with this type of tandem).

The fabric is a mix of 42 g/m² and 38 g/m². This has made the wing lighter but, in the end, this 41 m² tandem isn't particularly light, weighing 8.7 kg. The materials chosen for the wing's other components are pretty tough: classic risers, large and easy to use at take off and stuffed brake handles suggesting a preference for comfort and durability rather than light weight.

The behaviour at take off also corresponds to the specifications: a no nonsense tandem for working, which scoops up the air, comes up easily and doesn't have a tendency to overfly except in strong wind of course, where it might need, like any other wing, a little bit of brake.

In the air, we found all the characteristics promised in the specifications: Renaud sums them up in the box opposite. It's worth noting that we also flew with children, slightly under the lower weight limit. For this type of flying the wing also behaved perfectly well.

In our next article 'Tandems', we'll give more details about this wing and, in particular, its behaviour at the limit of normal flight, where the Double U was also very well behaved.

## THE PRO'S OPINION

**Renaud François is an instructor and tandem pilot with Volaime, in Cerdagne, in the eastern Pyrenees. He flies in very varied conditions. In the afternoon the wind and the thermals can be pretty strong. It's a crossroads of currents of air coming up from Spain and winds from the northwest and the east. But it's also an amazing region for learning or practicing your flying (www.volaime.com).**

### RENAUD SUMMARISES HIS TEST OF THE AIRCROSS DOUBLE U

*PREPARATION:*

- *Untangling the lines was fast and smooth using a comb method (the brake line in the outer hand and the different ranks of lines between the fingers of the inner hand)*

*TAKE OFF:*

- *Inflation: good capacity to scoop, comes up regularly and smoothly without a difficult step.*
- *Pulling the wing up: no particular tendency to overfly in the wind speeds encountered during our tests.*
- *Load take up: fast and therefore very comfortable with good handling through the controls*

*FLYING:*

- *Stable and damped but still with a lot of feedback from the air.*
- *Stable big ears which quickly reopen.*

*GENERAL BEHAVIOUR:*

- *Rigid wing, acts as a single block, solid in turbulence and penetrates without porpoising.*
- *Reactive controls with a certain amount of solidity.*

*TURNING*

- *Goes into the turn with little inertia, first in the roll, then quickly in the yaw.*
- *Nice gliding sensation with a feeling of smooth flat turns.*

*BEHAVIOUR IN THERMALS:*

- *Good feedback through the controls.*
- *Precise and efficient giving good performance.*

*LANDING:*

- *Nice flare with the different wing loadings used.*

| DOUBLE U - TECHNICAL DATA | |
|---|---|
| Manufacturer: Aircross Web: http://www.aircross.eu<br>Mail: info@kontest.eu Tel: +49 (0) 5321/7569006 | |
| YEAR | 2015 |
| SIZE | 53 |
| CELLS | 21 |
| FLAT SURFACE AREA [m²] | 41 |
| PROJECTED SURFACE AREA [m²] | 35.73 |
| FLAT WINGSPAN [m] | 14.63 |
| PROJECTED WINGSPAN [m] | 12.10 |
| FLAT ASPECT RATIO | 5.20 |
| PROJECTED ASPECT RATIO | 4.08 |
| ALL UP WEIGHT [kg] | 130 - 220 |
| WEIGHT OF THE WING [kg] | 8.7 |
| CERTIFICATION | B |
| MATERIAL | Porcher 9017 E25A 38g/m²<br>Dominico 30 D 42 g/m² |
| PRICE [€] | 4 100 |



A nice detail: a stuffed brake handle.


The trimmers.


A classic way of increasing the manoeuvrability: using the controls shortens the trailing edge on the brake side.

# AIRCROSS DOUBLE U

# FUEL FOR FLYING

*A little reminder for paramotor pilots at the beginning of the season about what's essential for a good mix…*

In front of the Fresh Breeze workshops, the company have their own petrol station.

Moreover, the company sell their own oil for mixing. The 'Special Blu 2T' is available for 16.40 €, plus P&P, from their online shop.
The particular feature of this oil is its very noticeable blue colour. It is therefore easier to see if a jerrycan of fuel already contains oil or not.


Practical: a measure showing the quantities of oil necessary to give a good mix depending on the quantity of petrol. The cap prevents dirt from getting stuck in the container during storage. Price:13.90 €



Five years ago, we looked into the different sorts of fuel. The results showed that in France, for example, Unleaded 95 often contained too much Bioethanol. Since April 2009, up to 10% of 95 petrol could legally come from the fermentation of cereals, beetroot and other plants. But our engines can't cope with alcohol; it attacks the engine's hoses and seals.

We asked Adventure and Fresh Breeze their opinion once again. The result was the same conclusion five years later: try to use unleaded 98, but definitely not unleaded 98 E10 and avoid 95.

As far as the mixes are concerned, the quality of the oil sold commercially seems to have improved more and more. Even the least expensive oils today are often as good as the most expensive ones a few years ago.

As a general rule, the manufacturers advise a specific synthetic oil. Adventure advise Minerva 2TSR, and Fresh Breese even offer their own Spécial Blu mix, which is much more coloured than Castrol red and lets you see more easily if the petrol already contains oil or not.

As far as the percentage is concerned, don't overdo it; it isn't good for the motor which gets sooted up. Put in exactly the quantity recommended by the manufacturer for your engine (normally between 2% and 2.5%). These figures already include a fairly sizeable margin.

## LONG LIVE PRECISION

**If you pour 1 litre of oil into 10 litres of petrol, you don't get a 1:10 mix but 1:11. Taking into account the precision required in our sport as well as the existing margins, this is absolutely not a problem and we are allowed the same lack of precision for our reminder on the right. For a laboratory assistant in the petrochemical industry, on the other hand, it would be a completely different kettle of fish.**

| Quantity oil(l) | Quantity of petrol (l) | Total quantity(l) | Real percentage | Indicated percentage (%) | Indicated ratio (1:X) |
|---|---|---|---|---|---|
| 0,10 | 10 | 10,10 | 0,99% | 1,0% | 1:100 |
| 0,15 | 10 | 10,15 | 1,48% | 1,5% | 1:67 |
| 0,20 | 10 | 10,20 | 1,96% | 2,0% | 1:50 |
| 0,22 | 10 | 10,22 | 2,15% | 2,2% | 1:45 |
| 0,25 | 10 | 10,25 | 2,44% | 2,5% | 1:40 |
| 0,30 | 10 | 10,30 | 2,91% | 3,0% | 1:33 |
| 0,33 | 10 | 10,33 | 3,19% | 3,3% | 1:30 |
| 0,35 | 10 | 10,35 | 3,38% | 3,5% | 1:29 |
| 0,40 | 10 | 10,40 | 3,85% | 4,0% | 1:25 |
| 0,45 | 10 | 10,45 | 4,31% | 4,5% | 1:22 |
| 0,50 | 10 | 10,50 | 4,76% | 5,0% | 1:20 |
| 0,55 | 10 | 10,55 | 5,21% | 5,5% | 1:18 |
| 1,00 | 10 | 11,00 | 9,09% | 10,0% | 1:10 |

## MIX REMINDER

| Quantity petrol (l) | Quantity oil (ml) | Quantity oil (l) | Desired Ratio |
|---|---|---|---|
| 1 | 10 | 0,01 | 1:100 or 1% |
| 2 | 20 | 0,02 | |
| 3 | 30 | 0,03 | |
| 4 | 40 | 0,04 | |
| 5 | 50 | 0,05 | |
| 10 | 100 | 0,10 | |
| 20 | 200 | 0,20 | |
| **Quantity petrol (l)** | **Quantity oil (ml)** | **Quantity oil (l)** | **Desired Ratio** |
| 1 | 20 | 0,02 | 1:50 or 2 % |
| 2 | 40 | 0,04 | |
| 3 | 60 | 0,06 | |
| 4 | 80 | 0,08 | |
| 5 | 100 | 0,10 | |
| 10 | 200 | 0,20 | |
| 20 | 400 | 0,40 | |
| **Quantity petrol (l)** | **Quantity oil (ml)** | **Quantity oil (l)** | **Desired Ratio** |
| 1 | 25 | 0,03 | 1:40 or 2,5 % |
| 2 | 50 | 0,05 | |
| 3 | 75 | 0,08 | |
| 4 | 100 | 0,10 | |
| 5 | 125 | 0,13 | |
| 10 | 250 | 0,25 | |
| 20 | 500 | 0,50 | |
| **Quantity petrol (l)** | **Quantity oil (ml)** | **Quantity oil (l)** | **Desired Ratio** |
| 1 | 30 | 0,03 | 1:33 or 3 % |
| 2 | 60 | 0,06 | |
| 3 | 90 | 0,09 | |
| 4 | 120 | 0,12 | |
| 5 | 150 | 0,15 | |
| 10 | 300 | 0,30 | |
| 20 | 600 | 0,60 | |
| **Quantity petrol (l)** | **Quantity oil (ml)** | **Quantity oil (l)** | **Desired Ratio** |
| 1 | 40 | 0,04 | 1:25 or 4 % |
| 2 | 80 | 0,08 | |
| 3 | 120 | 0,12 | |
| 4 | 160 | 0,16 | |
| 5 | 200 | 0,20 | |
| 10 | 400 | 0,40 | |
| 20 | 800 | 0,80 | |

**When we fill up a jerrycan, we often take exactly 10 litres, and the quantity of oil is therefore easy to calculate. On the other hand, if you add one, two or three litres, it is less obvious. Here's a little table to take with you on your smartphone, or print onto a piece of paper and keep in your harness pocket.**

## SURVIVAL KIT FOR A PARAMOTORIST

**We introduced this idea two years ago: a little survival kit to put in your harness pocket. This 'Jollytank' flexible fuel bag only costs 3.50 € along with a little bottle which costs about the same price from the local pharmacy. The Jollytank is ideal as an emergency jerrycan whether for your local flights or on vol bivouacs. When folded empty this fuel tank weighs 50 grammes and takes up hardly any space. If you run out of petrol in the middle of the countryside, you can go to the nearest petrol station and fill it up with a maximum of 8 litres. It closes very simply and is nonetheless reliable and completely sealed, except if you leave it full for several weeks. Its pouring spout works well to fill the tank of your engine. It can be used several times. In a bottle from the pharmacy, take the necessary amount of oil to make the correct mix. Wrap it all up in sealed freezer bags and put this 'survival bag' in your harness.**
**http://ulmtechnologie-shop.com/fr/circuits-essence/4116-reservoir-plastibag-jollytank.html?search_query=jollytank&results=1**


Photos : Burkhardt



More and more paramotors have tanks which are easy to detach. This lets you hide your paramotor and go off with your tank under your arm after landing in the middle of the countryside.

It's useful to have a quick connector between the tank and the motor.


Photos : Burkhardt

# Help!

The shaker siphon is one of the most useful inventions when it comes to decanting the petrol from a jerrycan into the tank of a paramotor without spilling it all over the harness and chassis.

Mathieu Rouannet is the first pilot that we saw using this device which is as simple as it is great. You can find it on Ebay or in a car accessory shop. Since then, this 10 quid tube hasn't been out of our sight. Thanks to a little ball at the end, by shaking the tube in the jerrycan, the pilot makes the petrol rise up the tube until it ends up flowing all by itself due to the siphon effect. You just have to wait until the tank is empty.

# STAND UP FLYING ON A DRONE

## FRANKY ZAPATA AND HIS FLYBOARD AIR

In April, we initially thought this was an April fool prank. Franky Zapata introduced the Flyboard Air, a machine which resembles a jet drone with the pilot standing on top. We had our doubts. There is very little stability on this small surface (the little Flyboard Air), with a centre of gravity a lot higher (the pilot). As far as power is concerned, no problem: the 4 turbo jets should be enough. At Jetvat (www.jetcat.de) the turbine manufacturer for drones and models, for example, for 6000 € you can buy a 36 cm long jet engine, with 300 N thrust, which consumes 1 litre of "Jet A1" kerosene per minute.

The problem is more the stability of the unit. Franky told us himself that a purely electronic stabiliser isn't possible because each jet engine takes a certain time to react (up to a maximum of 2 seconds, from 0 to 125 000 revs/min), and that the major part depends on the speed of the human brain and how good the person is at balancing on their legs.

Photo: www.liamdmckenna.com pour www.zapata-racing.com

**Franky Zapata also invented the classic Flyboard, a sport for all, which is catching on near beaches. Flying thanks to hydrojets.** https://www.youtube.com/

Photo: www.liamdmckenna.com pour www.zapata-racing.com

Four jet engines in the middle to give the lift and two other motors to control it on either side.


Photos: D.R. pour www.zapata-racing.com

Franky Zapata with his certificate from the Guinness Book of Records. There is starting to be a lot of proof for something which was supposed to be a fake.

But apparently his machine really works. The Guinness book of records has recognised his feat which he achieved during a flight of 2252 metres on 30/04/2016 near Marseille.He flew at an altitude of 50 m and at nearly 60 km/h, but his machine should be capable of flying at 150 km/h and theoretically reaching 3000 metres of altitude. It's hard, but we're beginning to really believe in this amazing toy!


https://youtu.be/rNKRxsNyOho
The video made by Franky Zapata's team during the record.

# S.M.A.A.P
## SIMULATOR

Photos : DR SMAPP

*It's the best way to simulate a paraglider without actually taking off - a great idea for learning. A Spanish school has been working for years on this very high performance machine.*

S.M.A.A.P is a machine which allows the user five automated movements in the air above a treadmill. It makes training courses on taking off and landing possible, with a range of speeds from 0 to 50 km/h. You can work on inflation, controlling the wing during both reverse and forward inflations, running to take off and also flying techniques such as angles of attack and big ears.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